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Retrospective analysis of smoking cessation campaign in aviation personnel

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Abstract

Aim: Because of many health hazards, we carry out training and treatment efforts to reduce the use of tobacco products by aviation personnel. In this retrospective study, we aimed to evaluate our smoking cessation rates according to treatment modality, patients' education level, and marital status via outpatient clinic records.

Material and Methods: The records of the Smoking Cessation Policlinic between January 01, 2016 and April 30, 2018 were analyzed in this study. Patients' demographics, smoking attitudes, cessation method, the Fagerström Test for Nicotine Dependence (FTND), anxiety and depression scales were evaluated. The Kolmogorov-Smirnov normality test, Independent Samples T-Test or the Mann-Whitney-U test were used in between-groups analyzes. The Chi-Squared test was used for testing relationship between categorical variables.

Results: One hundred forty-two patients were included in this study and 3 of them were female. All females and 38.9% of males quit smoking. The overall cessation rate was 40.1%. The duration of smoking was higher, the first and last measured CO values were lower, and the follow-up periods were longer in the quitters' group ($p<0.05$). The cigarettes smoked per day and FTND scores were higher in the non-quitters' group ($p>0.05$). The cessation rate was slightly increased with education duration ($p>0.05$). Married patients' cessation rate was higher than single or separated patients ($p>0.05$). The highest cessation rate was achieved in the Varenicline group ($p<0.001$).

Discussion: The use of tobacco products in aviation personnel is similar to that of the normal population. We can suggest that cessation success can be affected by marital status, addiction level, education, and the treatment method.

Keywords

Smoking Cessation; Fagerström test; Nicotine addiction; Aviation personnel

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Introduction

Many chemicals are released during the combustion of tobacco. These chemicals contain toxic and carcinogenic substances that can cause many diseases and cancers. The most well-known of these are tar and carbon monoxide. In addition, smoking is closely related to COPD and lung cancer [1]. Nicotine addiction is the leading cause of smoking. Because of many health hazards, we carry out training and treatment efforts to reduce the use of tobacco and tobacco products by aviation personnel. In 2015, the smoking cessation campaign was started, and lectures were given about the hazards of smoking. We gave consultancy to aviation personnel about smoking cessation therapies in this period. Smoking cessation outpatient clinic was established in January 2016. The patient's health status, compliance with the treatment and the side effects of the smoking cessation drug were taken into consideration during the selection of smoking cessation methods in our outpatient clinic. In this retrospective study, we aimed to evaluate our smoking cessation rates according to treatment modality, patients' education level, and marital status using outpatient clinic records.

Material and Methods

Each stage of the research was carried out based on the Helsinki Declaration, and the local Clinical Research Ethics Committee approved this study. Our study was planned as a retrospective study. The records of the patients who applied to the Smoking Cessation Policlinic between January 01, 2016 and April 30, 2018 were included and analyzed in this study. Demographic characteristics, smoking behavior and attitudes, cessation method, the Fagerström Test for Nicotine Dependence (FTND), anxiety and depression scales, and exhaled carbon monoxide (CO) levels were evaluated.

Patient smoking status at the beginning of the treatment, compliance with the treatment, and the cessation status were controlled with multiple implications of the "CO Exhalation Test" during the first visit and the follow-up period. Patients who had negative results of the CO Exhalation test especially in the last visit of the following period were accepted as "quitter". The study data were edited in Microsoft Excel and statistical analysis was executed in the SPSS program. The Kolmogorov-Smirnov normality test was done for all parameters. The Independent Samples T-Test or the Mann-Whitney-U test were used in between-groups analyzes. The Chi-Squared test was used for testing relationships between categorical variables. The Spearman Correlation test was used for ordinal variables.

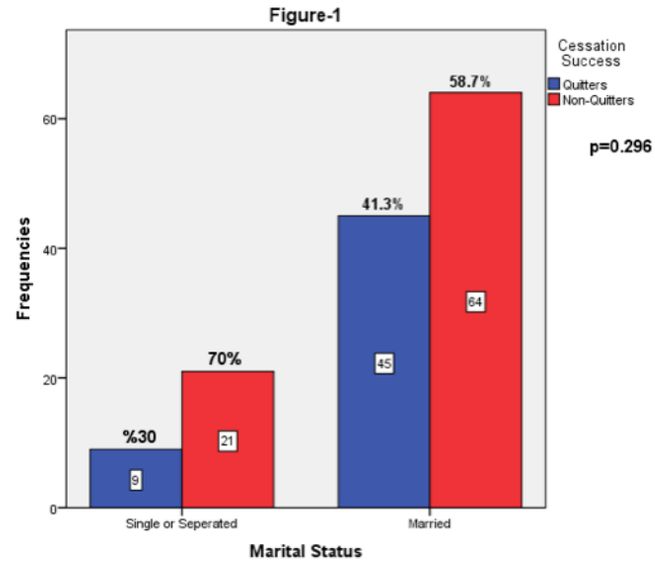

Figure 1. The effect of marital status on smoking cessation. *Smoking cessation status according to marital status in male patients. The Chi-Squared test was used for analyzes.*

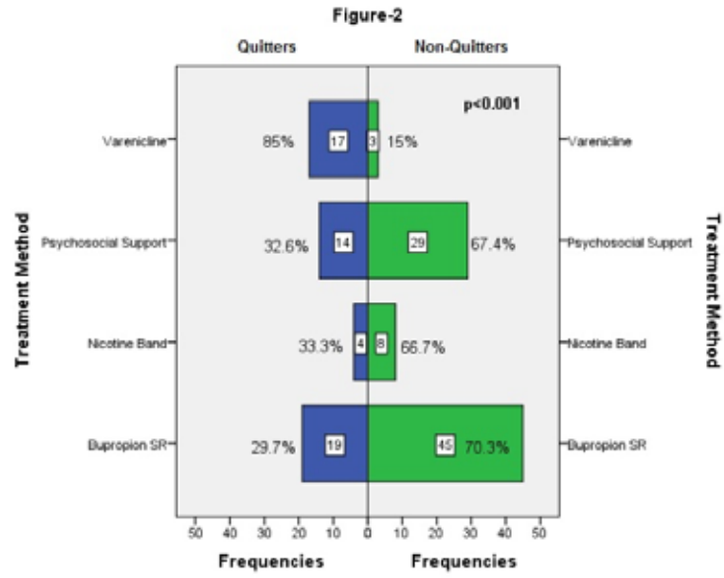

Figure 2. Smoking cessation rates according to the treatment method.

Smoking cessation rates according to the treatment method in male patients. The Chi-Squared test was used for analyzes. One cell (12,5%) has expected count less than 5. The minimum expected count is 4,66.

Results

One hundred and ninety-one patients were admitted to our smoking cessation policlinic between January 01, 2016 and April 30, 2018. One hundred eighty-seven of them were males and 4 were females. The descriptive statistics of all applicants are presented in Table 1.

Forty-nine (48 male, 1 female) smokers did not attend the outpatient appointment after the counseling and were excluded from the study. One hundred forty-two patients were included in this study and 3 of them were female. All 3 female cases (100%) and 38.8% of males quit smoking after treatment. The overall cessation rate of smoking cessation policlinic was 40.1%. In our study, between-group analyzes could not be performed due to the small number of females receiving the treatment. A total of 139 male subjects were included in between-group analyzes in our study.

Cases were grouped according to smoking cessation status and normality analysis of these subgroups was evaluated using the Kolmogorov-Smirnov test. Only age and smoking duration variables were found to distribute normally in the subgroups formed according to smoking cessation status.

The mean age was similar between the groups and the difference was statistically insignificant. The duration of smoking was high (p = 0.028), the first and last measured CO

Table 1. The comparison of demographics, smoking attitudes, scores, and results of patients according to the gender

Gender		Age	BMI	Onset	Smoking Per Day (N)	Smoking Duration (Year)	Pack Per Year	First CO	FTND Score	Depression Score	Anxiety Score
Male	N	187	171	187	187	187	187	179	186	187	186
	Mean± SD	34.67± 8.41	25.51±3.62	16.81±3.55	20.66±8	17.56±8	15.87±9.31	10.25±5.34	5.12±2.34	5.74±3.52	6.46±3.55
Female	N	4	4	4	4	4	4	4	4	4	4
	Mean± SD	30.50±8.27	23.75±1.5	18.75±1.5	13.75±4.78	12±8.45	9±8.08	7.75±2.87	2.5±1.73	5.75±7.54	6.50±3.70

Descriptive statistics of all smoking cessation policlinic applications by gender. FTND: The Fagerström Test for Nicotine Dependence, CO: Carbon Monoxide, BMI: Body Mass Index.

Table 2. The comparison of demographics, smoking attitudes, scores, and results of male patients according to the cessation status

		Age	Smoking Per Day (N)	Willing Insistence	Onset Age	Smoking Duration (Year)	Pack Per Year	Depression Score	Anxiety Score	FTND Score	BMI	First CO	Last CO	Follow-up (Week)
Quitters	N	54	54	52	54	54	54	54	54	54	45	54	53	54
	Mean± SD	36.54± 9.04	18.57± 7.53	4.21± 0.70	16.67± 3.17	20.17± 8.29	17.04± 9.91	5.59± 3.69	6.35± 4.00	4.52± 2.321	24.89± 3.19	8.28± 4.59	2.25± 0.94	12.00± 6.08
Mon-Quitters	N	85	85	85	85	85	85	85	85	85	82	85	84	85
	Mean± SD	34.59± 8.29	21.07± 7.24	4.12± 0.89	16.79± 3.86	17.16± 7.44	15.09± 7.22	5.36± 3.28	6.62± 3.70	5.28± 2.323	25.95± 3.61	11.08± 5.60	11.68± 6.68	9.53± 5.70
P		0.194*	0.051**	0.796**	0.899**	0.028*	0.477**	0.815**	0.534**	0.069**	0.128**	0.004**	0.000**	0.008**

The comparison of demographics, smoking attitudes, scores, and results of male patients who started smoking cessation treatment after counseling.
* The Independent Samples t-test was used in between-groups analyzes.
**The Mann-Whitney-U Test was used in between-groups analyzes.
FTND: Fagerström Test for Nicotine Dependence, CO: Carbon Monoxide, BMI: Body Mass Index.

Table 3. Comparison of cessation rates according to education level

*p=0.995			Group		Total
			Quitters	Non-Quitters	
Education Status	Primary Education	N	3	5	8
		%	37.5	62.5	
	High School	N	38	60	98
		%	38.8	61.2	
	Higher Education (University or Higher)	N	13	20	33
		%	39.4	60.6	
Total		N	54	85	139
		%	38.8	61.2	

Comparison of smoking cessation status according to the education level of male patients.*The Chi-Squared test was used for analyzes.

values were low (p <0.001) in the quitters group. The number of cigarettes smoked per day and FTND scores were found to be higher in the non-quitters group (p>0.05). Patients were closely monitored and outpatient follow-up times were higher in the quitter's group (p=0.008) (Table 2).

Control visit number of the quitters group (mean: 2.93±1.26; median: 3) was found to be higher than the non-quitters group (mean: 2.51±1.14; median: 2). A statistically significant weak correlation was found between the number of control visits and treatment success (r= 0.178, p=0.036).

It was found that the cessation rate was slightly increased with the increase of the education period (p>0.05) (Table 3).

The cessation rate of married patients was higher than single, or separated patients (p>0.05) (Figure 1).

Combine therapy was not used in our outpatient clinic and the highest smoking cessation rate was achieved in the Varenicline group (p<0.001). Smoking cessation rate of Varenicline group was higher than Psychosocial Support (85.0% versus 32.6%; odds ratio (OR):11.74; 95% CI, 2.94–46.81; p<0.001); higher than Nicotine Band (85.0% versus 33.3%; OR:11.33; 95% CI, 2.04–63.08; p<0.003); higher than Bupropion SR (85.0% versus 29.7%; OR:13.42; 95% CI, 3.52–51.23; p<0.001) (Figure 2). Comparison of Nicotine Band, Bupropion SR, and Psychosocial Support therapies showed that the difference in the cessation rates was not statistically significant (p>0.05).

Discussion

Smoking contributes to significant morbidity and mortality, including chronic obstructive pulmonary disease and lung cancers [1]. The global rate of tobacco smoking has declined substantially in recent years with an estimated 1.1 billion people consume tobacco products worldwide [2]. Training and treatment efforts were carried out globally to reduce the use of tobacco and tobacco products. While awareness of tobacco products' harmful effects has increased, determinants associated with smoking status should be well analyzed.

Nagano T. et al. stated that for effective smoking cessation, making regular contact with healthcare workers is important. As a key to the continuation of smoking cessation, it is important to provide support for the prevention of re-smoking when relapse is likely to occur usually 3 months after the start of smoking cessation [3]. In our outpatient clinic, patients are closely monitored and, in every visit, non-invasive CO levels are measured and smoking status is documented in the patient records. In our study, the follow-up period was calculated via the outpatient clinic records, and the duration of the follow-up period might be different for each patient. Our follow time is similar to the published literature and outpatient follow-up times were higher in the quitter's group (p=0.008). Control visit number of the quitters group was found to be higher than the non-quitters group and a statistically significant weak correlation was found between the number of control visits and

cessation rate (r= 0.178, p=0.036).

Chang CP et al. found that the smoking cessation rate was 48.1% in the elderly population and declared no significant difference among the baseline characteristics between quitters and non-quitters except for the type of medication. There was no difference between the two groups in terms of age, gender, body weight, smoking duration, the daily consumption number of cigarettes, FTND score, and exhaled CO concentration [4]. In our study, it was found that the rate of smoking cessation polyclinic was 40.1% and the duration of smoking was higher ($p < 0.05$) and the follow-up periods were longer ($p < 0.05$) in the quitters group. In addition, the exhaled air CO test was performed on all patients at each control visit, and the mean value of the first and last CO tests results was lower in the quitters group than the non-quitters group ($p=0.004$, $p<0.001$). The number of cigarettes smoked per day and FTND scores were also found to be higher in the non-quitters group ($p>0.05$). In our study, the overall cessation rate was similar to the published literature. We can suggest that patients in the quitters group had a longer smoking history, were mentally more ready for the cessation and had a higher compliance with the treatment.

Peña P et al. report that years of education were associated with failure in therapy in the multivariate analysis and people with more than 12 years of education had significantly less risk of failure (OR 0.38, $p = 0.014$) [5]. We also found that the smoking cessation rate was slightly increased with the increase of the education period in our study ($p>0.05$).

Parekh TM et al. stated that marital status was significantly associated with reporting of former-smoker status; single (OR=0.66, 95% CI 0.51 to 0.87), divorced (OR=0.60, 95% CI 0.50 to 0.72) and widowed (OR=0.70, 95% CI 0.57 to 0.85) participants had lower odds of former-smoker status compared to those who were married [6]. Sagayadevan V. et al. report that only marital status was found to be a significant correlate of health reasons as a motivator to stop smoking and those who were ever married were less likely to report health reasons as a motivation to stop smoking than those who were never married ($p=0.002$) [7]. In our study, the cessation rate of married patients was higher than single or separated patients ($p>0.05$). Gonzales et al. showed that 4-week continuous abstinence rate for Varenicline vs. placebo was 44.0% and 17.7% (OR, 3.85; $P<.001$); Varenicline vs. Bupropion SR 44.0% and 29.5% (OR, 1.93; $P<.001$), consecutively. They also state that Bupropion SR was significantly more efficacious than placebo (OR, 2.00; $P<.001$) [8]. Hurt RD. and colleagues showed that the prevalence of smoking-cessation rates at six weeks in the group taking 300 mg of Bupropion/day was significantly higher than that of a placebo group (44.2 % versus 19.0 %, $p <0.01$) [9]. Karadoğan D et al. report that patients smoking quit rate was 37.9% after the third month and Varenicline use was associated with higher treatment adherence ($p<0.001$) and only being in the treatment-adherent group was associated with cessation rate (OR=3.01, 95%CI: 1.88–4.81, $p=0.001$) [10]. In our study, the highest smoking cessation rate was achieved in the Varenicline group ($p<0.001$). Comparison of cessation rates of Nicotine Band, Bupropion SR, and Psychosocial Support therapies showed that the difference in the cessation rates was not statistically significant ($p>0.05$).

The use of tobacco products among aviation personnel is similar to that of the general population, and physicians who carry out aviation examinations and practice preventive medicine in the aviation field should be aware of the importance of this issue and have a good knowledge of how to treat tobacco dependence [11]. In addition, it was reported that smoking was the risk factor for cardiovascular diseases in a study conducted in commercial pilots [12]. In Giannakoulas G. et al.'s study, performance evaluations were conducted with the pilots via questionnaires, psychomotor test batteries, and computer-aided programs. These pilots were not allowed to smoke during flight for 12 hours; prolonged reaction times, irritability, and reasoning deterioration were detected in pilots, but these findings were not statistically significant [13]. We also believe that the prevalence of smoking in aviation personnel is similar with the general population and might threaten the aviation safety. Thus, we started a campaign in our workplace to reduce smoking, consisting of training, consultancy, and treatment. Our results showed that during the study period, our smoking cessation policlinic achievement rate was 40.1%.

Conclusion

Aviation personnel participate in medical checks regularly. They regularly attend healthy lifestyle classes including studying the harmful effects of tobacco products. They are highly motivated and believe in the cessation therapies and they are too cautious about their health.

Our result was fairly consistent with the published literature. However, the smoking cessation rate of Varenicline and Psychosocial Support is higher than in previous studies. We think that some characteristics of aviation personnel and working requirements might have contributed to these positive findings.

Published studies showed that smoking adversely affects the health and work performance of aviation personnel. Although the fight against cigarette addiction is very difficult and time-demanding, we believe that our efforts will protect and improve the health of aviation personnel.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest

None of the authors received any type of financial support that could be considered potential conflict of interest regarding the manuscript or its submission.

References

1. Durham AL, Adcock IM. The relationship between COPD and lung cancer. Lung Cancer. 2015; 90(2): 121–7.

2. Riahi F, Rajkumar S, Yach D. Tobacco smoking and nicotine delivery alternatives: patterns of product use and perceptions in 13 countries. F1000Res. 2019; 8: 80.

3. Nagano T, Katsurada M, Yasuda Y, Kobayashi K, Nishimura Y. Current pharmacologic treatments for smoking cessation and new agents undergoing clinical trials. Ther Adv Respir Dis. 2019; 13. DOI: 10.1177/1753466619875925.

4. Chang CP, Huang WH, You CH, Hwang LC, Lu IJ, Chan HL. Factors correlated with smoking cessation success in older adults: a retrospective cohort study in

Taiwan. Int J Environ Res Public Health. 2019; 16(18): 3462.
5. Peña P, Zagolin M, Acuña M, Navarrete S, Bustamante P, Canals A. Factors associated with success of a smoking cessation program. Rev Med Chil. 2016; 144(8): 965- 71.
6. Parekh TM, Wu C, McClure LA, Howard VJ, Cushman M, Malek AM, et al. Determinants of cigarette smoking status in a national cohort of black and white adult ever smokers in the USA: a cross-sectional analysis of the REGARDS study. BMJ Open. 2019; 9(5): e027175.
7. Sagayadevan V, Abdin E, Shahwan S, Satghare P, Devi F, Cetty L, et al. Motivations to quit smoking and challenges faced during cessation among individuals with first episode psychosis in Singapore. Early Interv Psychiatry. 2019; DOI: 10.1111/eip.12799.
8. Gonzales D, Rennard SI, Nides M, Oncken C, Azoulay S, Billing CB, et al. Varenicline, an alpha4beta2 nicotinic acetylcholine receptor partial agonist, vs. Sustained-Release Bupropion and placebo for smoking cessation: a randomized controlled trial. JAMA. 2006; 296: 47–55.
9. Hurt RD, Sachs DP, Glover ED, Offord KP, Johnston JA, Dale LC, et al. A comparison of Sustained-release Bupropion and placebo for smoking cessation. N Engl J Med. 1997; 337: 1195-202.
10. Karadoğan D, Önal Ö, Şahin DS, Kanbay Y, Alp S, Şahin Ü. Treatment adherence and short-term outcomes of smoking cessation outpatient clinic patients. Tob Induc Dis. 2018; 16: 38.
11. Grossman A, Landau D-A, Barenboim E, Goldstein L. Smoking Cessation Therapy and the Return of Aviators to Flying Duty. Aviat Space Environ Med. 2005; 76: 1064 –7.
12. Houston S, Mitchell S, Evans S. Application of a Cardiovascular Disease Risk Prediction Model Among Commercial Pilots. Aviat Space Environ Med. 2010; 81: 768 – 73.
13. Giannakoulas G, Katramados A, Melas N, Diamantopoulos I, Chimonas E. Acute Effects of Nicotine withdrawal Syndrome in Pilots During Flight. Aviat Space Environ Med. 2003; 74: 247–51.

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